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ABSTRACT

Teacher perception of a student's IQ may bias adaptive behavior measures used for placement in special classes. The study investigated the effect of perceived IQ on teachers' ratings of disturbed and normal children on the Devereux Elementary School Behavior Rating Scale. Fifty-two urban severe behavior handicapped students, Grades K through 12, were each matched for age, race, sex, and IQ with students from regular classrooms (total N=62) from his/her home attendance zone as social and economic control. Regression techniques were used. Rater vectors accounted for rater differences. Results indicated perception of IQ accounts for significant variance above measured IQ on one factor, "classroom disturbance." There were correlations between the Devereux and measured IQ but no correlations between the Devereux and perceived IQ. (Author)

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THE CONFOUNDING OF PERCEPTION OF I.Q. ON A MEASURE OF ADAPTIVE BEHAVIOR

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THE CONFOUNDING OF PERCEPTION OF I.Q. ON A MEASURE OF ADAPTIVE BEHAVIOR

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Introduction

In the recent past, there has been a resurgence of emphasis on the measurement of adaptive behavior. The American Association on Mental Deficiency has adopted the position that any person diagnosed as mentally retarded must evidence a deficit in adaptive behavior as well as a deficit in intellectual ability (Grossman, 1973). Public Law 94-142 (Education for all Handicapped Children Act of 1975) and various court cases have focused on the need for measuring adaptive behavior as part of a multifaceted approach to placement (Huberty, Koller, & Brink, 1980).

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Measures of adaptive behavior have been viewed as a non-biased form of assessment for placement in special classes. Arguments in recent court litigation (Mattie, T., et al. v. Charles E. Holladay, D.C. 75-31-S) have emphasized the need to correct previous placement bias. Fisher (1978) and Talley (1979) both used a two-dimensional model of mental retardation (measures of intelligence and measures of adaptive behavior) and found evidence that past placement bias could be corrected. It is, therefore, highly probable that the incidence of measurement of adaptive behavior and its subsequent use in determining identification/placement and/or intervention programming decisions will increase in the future.

There is a disagreement among professionals as to what areas of adaptive behavior, e.g. school, home. community, should be included in the multifaceted assessment process. In addition, there is a question as to the appropriateness of placement and intervention/programming. There is, however, little dissension concerning the fact that the measures should be valid, reliable, unbiased, and normed on a population similar to the one on which they are to be applied (Coulter and Morrow, 1978). Potential biasing factors might include cultural background, social economic status, differences in rater perspective, e.g. parent vs. teacher, and I.Q. The effect of these on various measures of adaptive behavior has, to some extent, been explored (Spivack & Swift, 1967).

A potential problem exists concerning the differential effect I.Q. may have on measures of adaptive behavior. Typically, the effect of measured I.Q. is studied to see if it has an impact on a particular instrument. The instrument is often found to be free of I.Q. bias. A potential problem arises when the classroom teacher (or any other rater) has a preconceived opinion of the student's I.Q. There is evidence that teacher's expectations may affect his/her ratings of behavior and achievement (Rosenthal and Jacobson, 1960). It may be that the teacher's perception of the I.Q. of the student being rated rather than his/her measured I.Q. has a biasing effect on adaptive behavior measure.

Statement of the Problem

The objective of this study was to investigate the effect of perceived I.Q. on a measure of adaptive behavior, the Devereux Elementary School Behavior Rating Scale (1967) in regular and special classrooms. The 14 research hypotheses took the form:

> Perceived I.Q. accounts for a significant amount of variance in predicting Devereux ratings over and above measured I.Q.

Methodology

Sample

Fifty-two urban severely behavior handicapped (SBH) pupils were selected and matched with 52 pupils from regular classrooms on the basis of age, race, sex, and I.Q. A measure of

socioeconomic status was to be obtained by finding a match for each SBH pupil from his/her home attendance zone.

These pupils were attending a northeastern Ohio urban central city school idstrict. They were part of a larger sample in a study being conducted by Youngstown State University and the Ohio Department of Mental Health related to nutrition and adaptive behavior in the classroom.

Instrumentation

The Devereux Elementary School Behavior Rating Scale (DESB) adaptive behavior ratings were completed by individual classroom teachers who had, at minimum, two months experience with the selected pupils. The manual for this rating scale (Spivack & Swift, 1967) suggests that the instrument is appropriate for rating normal and special education children with whom the teacher has had a one-month minimum of experience. Further, the behaviors rated have been associated with academic achievement in both special and regular classrooms.

The 47 items have been factor-analyzed to produce 11 factors and 3 individual item scores. The factor scores and individual items have been grouped into 6 "profiles" which account for approximately 85% of all children in grades kindergarten through six (Spivack, Swift, & Prewit, 1972).

The scale test-retest reliabilities have been found to range between .85 and .91 for the factor scales, and .71 and .80 for the single item scales (see Table 1).

The I.Q. scores were obtained from school district pupil files. All scores represent individual I.Q. tests administered by licensed school psychologists. None of the scores was obtained prior to 1-1/2 years before the current study.

Perceived I.Q. scores represent the classroom teacher's estimate of the student's I.Q. These were obtained on a written form at the time of the study (see Appendix A). This form directed the teacher not to look up the pupil's actual I.Q. Normally, teachers in this district do not have access to I.Q. testing results. It is possible, however, that they may have had verbal confirmation of the measured I.Q. from the school psychologist. Therefore, these results reflect a conservative estimate.

Statistical Analysis

Data collection was carried out during the spring of 1979-80 and the fall and winter of 1980-81.

The data were analyzed using multiple linear regression techniques. These strategies have the advantage of flexibility in accurately reflecting the specific research hypotheses (Newman, 1976). Because they are robust, these techniques allow for the violation of underlying assumptions to a greater extent than traditional analyses (McNeil, Kelly, & McNeil, 1975). Model comparison strategies utilizing the F test allowed the investigators to test for significance between the full and restricted models, where:

$$F = \frac{R_f^2 - R_r^2/df_N}{(1-R_f^2)/df_D}$$

where:

R_f^2 = variance accounted for by the full model

R^2_r = variance accounted for by the restricted model

df_N = degrees of freedom numerator = number of linearly independent vectors in the full model (m_1) minus the number of linearly independent vectors in the restricted model (m_2).

df_D = degrees of freedom denominator = number of subjects (N) minus the number of linearly independent vectors in the full model (m_1).

An example of a regression equation producing the R^2 for the full model is:

Full Model: $Y = a_o u + a_1 X_1 + a_2 X_2 + a_3 P_1 \ldots a_{12} P_{10} + E$

where:

Y = DESB rating score

u = unit vector

X_1 = measured I.Q.

X_2 = perceived I.Q.

$P_1 \ldots P_{10}$ = person vectors

$a_1 \ldots a_{12}$ = partial regression weights

E = error vector

This would be tested against the R^2 produced by a restricted model as shown below:

$$Y = a_o u + a_1 X_2 + a_2 P_1 \ldots a_{12} P_{10} + E$$

Each of the 14 hypotheses tested in this study used these procedures.

Because several teachers provided repeated ratings, i.e., rated more than one student, person vectors were included to account for teacher effects. The data, then, were, in some cases, dependent. A technique to deal with data that is partially independent and partially dependent was used (Newman, Benz, & Williams, 1980). Therefore, the subjects' effects for only those providing more than one rating were accounted for.

Adaptive behavior measures, while not specifically named in statute, were, in 1980, being used as part of the legal placement process in 40 of the 41 states surveyed by Huberty, Koller, and Brink (1980). The Devereux has been used as the adaptive behavior measure in several states, and is currently being considered for use in Ohio. Because of the consequences arising from using the DESB as a placement instrument, the researchers were willing to accept an improper result no more than 5 fimes out of 100. Therefore, an alpha level of .05 was selected.

Because 51 subjects were available for analysis, the power for the hypotheses tested was .58. The calculation was based on an alpha of .05, medium effect size (.15), and an m_1 (linearly independent vectors in the full model) of 13, and an m_2 (linearly independent vectors in the restricted model) of 12 (Cohen, 1977; Newman & Benz, 1979).

Results

A total of 51 responses were collected and analyzed. The matched group comparison between teachers of SBH pupils and teachers of regular classroom pupils was not accomplished because a work stoppage in the school district precluded collecting a major part of the regular classroom data. Eight pupils in regular classrooms and 43 in special classrooms comprised the total N that the replications were based upon. The analysis suggests four findings.

The hypotheses tested the relationships between measured I.Q. and perceived I.Q. in predicting the adaptive behavior measure. The criterion for each test was one of the DESB factors (e.g. classroom disturbance, achievement anxiety, etc.). Of the 14 hypotheses tested, one resulted in a significant F value ($F = 4.272$, $p = .045$, $R^2 = .302$). In this case, the amount of variance accounted for by perceived I.Q. in predicting the DESB "classroom disturbance" factor was significant when controlling for measured I.Q. and repeated measures. Results for all hypotheses tested appear in Table 2.

Secondly, intercorrelations among the Devereux factors and measured I.Q. and perceived I.Q. were examined. (See Table 3.) Four factors were significantly correlated with measured I.Q., specifically, "external blame," "achievement anxiety," "need closeness to teacher," and "quits." None of the factors was significantly correlated with perceived I.Q.

Thirdly, the correlation between measured I.Q. and perceived I.Q. was .1810 in these results. This correlation is small, suggesting that there was little relationship between these two variables. Teachers were poor judges of actual student I.Q. The last finding concerns the intercorrelations among the DESB factors.

There were many high correlations between the fourteen factors, particularly those shown by the underlined coefficients on Table 3. For example, "external-reliance" (F6) is correlated positively with factors 8, 9, and Items 1, 2, and 3. "inattentive-withdrawn" (F8) has a moderate positive correlation with items 1 and 3, and a negative correlation with factor 10. These and the other significant correlations noted on the matrix suggest that there may be, in fact, less than 14 underlying dimensions to the Devereux.

Discussion and Conclusions

Results suggest that perceived I.Q. accounts for a significant amount of variance over and above measured I.Q. in predicting the "classroom disturbance" factor. The correlation between this factor and perceived I.Q. is negative. This might suggest that, holding measured I.Q. constant, a teacher might rate a student as disturbing in a classroom setting in an inverse relationship to his/her perception of the student's I.Q. This might be due to the fact the items loading high on this factor differ from other items in that they represent

situations where the teacher would be more likely to take remedial action. A student rated as more disturbing in the classroom might be perceived as having a lower I.Q. Improper classification and placement on the basis of this rating may result. However, the size of the unique variance accounted for by perceived I.Q. from these data is relatively small ($R^2 = .079$).

One might expect that because the Devereux was designed to be free of measured I.Q. bias, there would be little correlation between the factors and measured I.Q. Further, one might expect that because the Devereux utilizes teacher perceptions, there might be correlations between the factors and perceived I.Q. Results here, however, did not confirm these expectations.

While there were no Devereux correlations with perceived I.Q., measured I.Q. was significantly correlated with the factors: "external blame," "achievement anxiety," "need closeness to teacher," and "quits." These results suggest that these four factors may be measuring the same dimensions as measured I.Q. (These correlations show that it was appropriate to hold measured I.Q. constant while analyzing the effects of perceived I.Q.) Therefore, the investigators concluded that the Devereux was not free of measured I.Q. bias.

The lack of significant correlations between perceived I.Q. and the DESB factor scores suggest that different underlying constructs were being measured. It seems, then, that teachers were rating students in this study without regard for

their own notions of the student's I.Q. However, the data indicate that ratings are related to measured I.Q. While teachers' perceptions of I.Q. are unrelated to the DESB ratings, they are not independent of measured I.Q.

These conflicting results suggest that further investigation is necessary. Replication of the study needs to be conducted with randomly selected subjects. Also, an N size large enough to allow for a ratio of 10 subjects per predictor variable is needed. These conditions would allow for covarying the correlated criterions (Newman & McNeil, 1979) and is necessary because the factor scores are not zero-correlated. With the increased N, both power and stability of regression weights would also be increased.

Replication would also allow for exploration of differences between regular classroom students and special classroom students. Tentative results indicate that the correlation matrices differ for these two groups. These results are based on a small N size resulting from the work stoppage. In addition to the four general findings, teachers in this study were poor judges of I.Q. If there were high correlations between perceived I.Q. and measured I.Q., it would be virtually impossible to unconfound the I.Q. and the Devereux ratings, given this design. If teachers think a student is bright it will affect his/her rating. Because there was no correlation here, the perceived I.Q. seemingly would not affect the ratings.

Findings suggest implications for the diagnostic use of the Devereux for teachers, the placement team, and researchers.

First of all, teachers' perceptions of I.Q. may not be related to what I.Q. tests actually measure. Secondly, the law requires measures of intelligence, achievement, and adaptive behavior for placement of students in special programs. Because the Devereux might be measuring the same constructs, one may question its use in attempting legal compliance. Finally, it seems important for researchers to control for I.Q. when using the Devereux. Even though it is supposed to be free of I.Q. bias, it, in fact, may not be.

TABLE 1

Devereux Elementary School
Behavior Rating Scale

Test-retest Means, Correlations, and
Standard Errors of Measurement

FACTORS	(Means (SDs) Initial	Retest	Test-retest Correlations	Standard Errors of Measurement
1	10.5 (4.9)	9.9[a] (4.4)	.91	2.0
2	10.7 (5.0)	9.5[a] (4.2)	.88	2.4
3	6.0 (3.0)	5.6[a] (2.6)	.87	1.5
4	6.9 (3.9)	6.2[a] (3.4)	.87	1.9
5	8.8 (4.5)	8.0[a] (4.0)	.85	2.4
6	14.7 (6.4)	13.7[a] (5.6)	.87	3.1
7	12.3 (3.6)	12.4 (3.4)	.86	1.8
8	10.2 (5.6)	9.6[b] (4.9)	.89	2.6
9	7.8 (3.6)	7.6 (2.9)	.88	1.7
10	11.0 (3.8)	11.2 (3.7)	.87	1.9
11	13.8 (4.6)	14.2[b] (4.4)	.89	2.1
ADDITIONAL ITEMS				
27	2.5 (1.6)	2.5 (1.5)	.72	1.1
40	2.7 (1.8)	2.3[a] (1.4)	.80	1.3
41	2.9 (1.9)	2.7[b] (1.8)	.71	1.1

[a]Significant at the .01 level.

[b]Significant at the .05 level.

Source: Spivack, G. and Swift, M. Devereux Elementary School Rating Scale Manual. Devon, Pennsylvania: The Devereux Foundation, 1967.

TABLE 2
Summary Table of Hypotheses Tested Showing
F Ratios, R^2 Values, and Significance Levels for Testing
Differences Between Predictor Variables (Measured I.Q., Perceived I.Q.) and
the Criterion (Factors from Devereaux Elementary School Behavior Rating Scale)

Hypothesis Number Predictors & Criterion	R^2f	R^2r	df	F	p	S/Ns[a]	N
H_1 Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.302	.223	1/38	4.272	.045	S	51
Criterion: Classroom Disturbance							
H_2 Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.204	.201	1/38	0.1331	.717	NS	51
Criterion: Impatience							
H_3 Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.424	.379	1/38	2.9516	.094	NS	51
Criterion: Disrespect-Defiance							
H_4 Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.559	.556	1/38	0.2699	.606	NS	51
Criterion: External Blame							
H_5 Full: $IQ_M + IQ_p + P_1 \ldots P_{10}$ E							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.425	.422	1/38	0.0269	.871	NS	51
Criterion: Achievement Anxiety							

Summary Table of Hypotheses Tested
(Continued)

H_6 Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.356	.351	1/38	0.2835	.598	NS	51
Criterion: External Reliance							
H_7 Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.358	.357	1/38	0.0489	.826	NS	51
Criterion: Comprehension							
H_8 Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.220	.219	1/38	0.0605	.807	NS	51
Criterion: Inattentive-Withdrawn							
H_9 Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.217	.177	1/38	1.979	.168	NS	51
Criterion: Irrelevant-Responsiveness							
H_{10} Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.405	.401	1/38	0.2634	.611	NS	51
Criterion: Creative Initiative							

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Summary Table of Hypotheses Tested
(Continued)

H_{11} Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.278	.267	1/38	0.5966	.445	NS	51
Criterion: Need Closeness to Teacher							
H_{12} Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.455	.453	1/38	0.1188	.732	NS	51
Criterion: Unable to Change							
H_{13} Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.284	.258	1/38	1.4074	.243	NS	51
Criterion: Quits							
H_{14} Full: $IQ_M + IQ_p + P_1 \ldots P_{10} + E$							
Restricted: $IQ_M + P_1 \ldots P_{10} + E$	.049	.043	1/38	0.2482	.621	NS	51
Criterion: Slow Work							

Note: IQM = Measured IQ

IQP = Perceived IQ

$P_1 \ldots P_{10}$ = Person Vectors

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TABLE 3

Intercorrelations Among Measured I.Q., Perceived I.Q., and the Fourteen Factors of the Devereux Elementary School Behavior Rating Scale (N=51)

	MIQ	PIQ	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	I1	I2	I3
MIQ																
PIQ	.1810															
F1	-.1310	-.0972														
F2	.1915	.2662	.3992[a]													
F3	.2354	.1508	.7461[a]	.3303[a]												
F4	.3502[a]	.2575	.4861[a]	.3499[a]	.6967[a]											
F5	.5279[a]	.1235	.3003[a]	.1108	.3330[a]	.4930[a]										
F6	.1420	.0861	.1965	.2818[a]	.0459	.3489[a]	.4805									
F7	.0689	-.0097	.1093	.0791	.1215	.0692	-.0677[a]	.3710[a]								
F8	.2268	-.0585	.0937	.2107	-.0715	-.0329	.1120	.5796[a]	-.4244[a]							
F9	-.1407	-.0015	.6703[a]	.4341[a]	.6206[a]	.4957[a]	.2348[a]	.4360[a]	-.0515	.2035						
F10	.1406	.2420	.3068[a]	.0358	.3556[a]	.3195[a]	.3208[a]	-.0559	.4855[a]	-.3777[a]	.3469[a]					
F11	.3125[a]	.0395	-.0463	-.1981	-.1784	-.0312	.3691[a]	.2603	.1722	-.0669	.0052	.3750[a]				
I1	-.1370	-.0857	.3078[a]	.3689[a]	.3553[a]	.3499[a]	.3869[a]	.5767[a]	-.2982[a]	.4540[a]	.4089[a]	.0047	-.0229			
I2	.0581	.0985	.0629	.2101	.0897	.4783[a]	.4038[a]	.4311[a]	-.1550	.0805	.0904	.1511	.2625	.2557		
I3	.3181[a]	-.0978	.1431	.2910[a]	-.0114	.1384	.1876	.4955[a]	-.3026[a]	.5178[a]	.1802	-.2584	.0754	.5665[a]	.3744[a]	

[a]Probability of less than or equal to .05 using critical ratio z test.

MIQ = measured I.Q.
PIQ = perceived I.Q.
F1 = classroom disturbance factor
F2 = impatience factor
F3 = disrespect-defiance factor
F4 = external blame
F5 = achievement anxiety
F6 = external reliance
F7 = comprehension
F8 = inattentive-withdrawn
F9 = irrelevant-responsiveness
F10 = creative initiative
F11 = need closeness to teacher
I1 = unable to change
I2 = quits
I3 = slow work

APPENDIX A

Teacher _____

Student _____

Student Number _____

For the student listed above, please write the numerical equivalent of your perception of his/her I.Q. This is to be done without reference to any records or standardized tests.

YOUR PERCEPTION OF STUDENT'S I.Q.: _____

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